Foreign Currency Loans – Demand or Supply Driven?

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Abstract

Motivated by concerns over foreign currency exposures of banks in Emerging Europe, we examine the currency denomination of business loans made in Bulgaria during the period 2003-2007. We analyze a unique dataset including information on the *requested and granted currency* for more than hundred thousand loans granted by one bank to sixty thousand different firms. This data set allows us to disentangle demand-side from supply-side determinants of foreign currency loans. We find that 32% of the foreign currency loans disbursed in our sample were actually requested in local currency by the firm. Our analysis suggests that the bank lends in foreign currency, not only to less risky firms, but also when the firm requests a long-term loan and when the bank itself has more funding in euro. These results imply that foreign currency borrowing in Eastern Europe is not only driven by borrowers who try to benefit from lower interest rates but also by banks hesitant to lend long-term in local currency and eager to match the currency structure of their assets and liabilities.

Keywords: foreign currency debt, banking

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1 Introduction

Firms in emerging markets often borrow in a foreign rather than the domestic currency. Unhedged foreign currency borrowing by the private sector is seen as a major cause of the financial crisis in East Asia in the 1990's (Goldstein and Turner 2002). Currently there are strong fears that foreign currency borrowing could again jeopardize financial stability, this time in Emerging Europe. Such instability could have stark repercussions for the Western European banks which dominate lending in many of these countries.

The risks arising from foreign currency borrowing in countries like Poland, Hungary, Romania and Bulgaria are particularly worrying, as these loans are predominantly held by retail clients, i.e. households and small firms. "*The point to grasp about Eastern Europe is that ... the debt is plagued by currency mismatches because in recent years households (and to a lesser extent, corporates) have increasingly chosen to borrow in low-interest currencies ...it has shades of the Asian tigers back in 1997.*" (Financial Times, 29/9/2007).

Existing evidence for the region examines the motivation for firms (Brown, Ongena and Yesin 2009) and households (Beer, Ongena and Peter 2010) to *choose* a loan in a foreign rather than the local currency. However, the currency denomination of loans depends not only on the firms' preferred currency, but also on the loan menu which banks *offer* to them. For example if the future value of the domestic currency is unpredictable and banks are risk-averse they may be wary of extending credit, in particular long-term credit, in the local currency (Luca and Petrova 2008). Banks' supply of foreign currency loans may also depend on their own access to foreign currency refinancing (Basso, Calvo-Gonzalez and Jurgilas 2007). Due to their foreign ownership many banks in Emerging Europe have substantial liabilities in euro. Limited by prudential regulations in their currency exposure, and limited by weakly developed forward markets in instruments to hedge foreign currency positions, banks

may lend in foreign currencies to preventing currency mismatches on their own balance sheets (Luca and Petrova 2008, Sorsa, Bakker, Duenwald, Maechler and Tiffin 2007).

In this paper we examine how the currency denomination of loans is determined in the negotiation process that takes place between small firms and one retail bank in Bulgaria. Our analysis is based on information for 105,589 business loans granted to over sixty-thousand firms during the period 2003-2007. In contrast to previous studies, we observe not only the currency as stated in the loan contract but also the borrower's requested currency. We are therefore able to examine to what extent the currency denomination of loans is determined by the demand and / or supply side and which are the driving factors on either side.

In Bulgaria, as in other Eastern European countries, foreign currencies and especially the euro play an important role for domestic financial transactions. On average, in the region 40% of customer deposits are held in foreign currency and 52% of loans are made in foreign currencies with the euro being by far the most important currency (see e.g. ECB 2007). Bulgaria is representative of this "eurization" of the banking sector with 40% of deposits and 47% of loans denominated in euro.

The bank at the heart of our analysis is focused on retail lending making it an interesting object of study, since especially retail clients seem to have been most involved in foreign currency transactions throughout Eastern Europe. As with the majority of banks in the region, the bank is mainly foreign owned and has substantial wholesale funding in foreign currency. Similar to other retail banks in Bulgaria and the Eastern European region as a whole, loans in foreign currency make up a substantial share (27%) of the bank's portfolio.

In line with theoretical predictions (see e.g. Cowan 2006), our results show that a firm in our sample is more likely to request a loan in foreign currency (euro) compared to the local currency (Bulgarian lev) if interest rates on foreign currency loans are lower, if the firm has foreign currency income, and if it faces lower distress costs in case of default. We also find

that larger firms, older firms and less opaque firms, i.e. those with a longer relationship with the bank are more likely to request a euro loan. We, however, also find that firms which need larger loans, long-term loans and mortgage loans are more likely to request a foreign currency loan. This result seems to be driven by firms anticipating the reluctance of the bank to extend large or long-term loans in local currency. Indeed, an analysis of panel data for repeat clients of the bank suggests that firms learn over time that long-term and mortgage loans are more likely to be granted in foreign currency.

Comparing the requested and granted currencies of loans in our sample we find that almost one-third of the loans disbursed by the bank in foreign currency were initially requested by the firm in local currency. We find that the bank is more likely to grant euro if the firm is of lower observable credit risk and less opaque to the bank. However, we also find that the bank is hesitant to offer large and long-term loans in local currency and is more likely to lend in euro when it has more funding in euro.

In sum, our results show that foreign currency lending is not only driven by borrowers who try to benefit from lower interest rates. We find that a substantial share of foreign currency retail loans in Eastern Europe is supply-driven, with banks hesitant to lend long-term in local currency and eager to match the currency structure of their assets and liabilities.

The rest of the paper is organized as follows. Section 2 reviews the existing theoretical and empirical literature. Section 3 describes our data while section 4 reports results from univariate and multivariate analyses. Section 5 concludes.

2 Currency Denomination of Firm Debt: Theory and Evidence

In this section we review existing theoretical and empirical studies on the currency denomination of firm debt, establishing the hypotheses for our empirical analysis and clarifying our contribution to the literature.

2.1 Theory

Looking at firms' demand for foreign currency loans, Goswami and Shrikande (2001) show that firms may use foreign currency debt as a hedging instrument for the exchange rate exposure of their revenues.[1] Goswami and Shrikande (2001) assume that the uncovered interest rate parity holds,[2] and therefore interest rate differentials do not motivate foreign currency borrowing in their model. However, a wide body of evidence suggests that this parity does not hold for many currencies (see e.g. Froot and Thaler 1990 or Isard 2006). Cowan (2006) and Brown, Ongena and Yesin (2009) consider firms' choices of loan currency in models where the cost of foreign currency debt is lower than the cost of local currency debt. Cowan (2006) shows that firms will be more likely to choose foreign currency debt the higher the interest rate differential, the larger their share of income in foreign currency and the lower their distress costs in case of default. The incentive to take foreign currency loans is weaker when the volatility of the exchange rate is higher, as this increases the default risk on unhedged loans.

Brown, Ongena and Yesin (2009) show that not only firms with foreign currency income, but also firms with high income in local currency (compared to their debt service burden) will be more likely to choose foreign currency loans, as their probability to default due to

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[1] Economic exposure to foreign currency can also be managed with foreign exchange derivatives. See Brown (2001) and Mian (1996) for a broad discussion of the corporate hedging instruments.
[2] This means that the differences in the nominal interest rates between currencies are cancelled out by the changes in their exchange rate so that the costs of foreign and local currency borrowing are identical.

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exchange rate movements is lower. Brown, Ongena and Yesin (2009) also examine the impact of bank-firm information asymmetries on loan currency choice.[3] They show that when lenders are imperfectly informed about the currency or level of firm revenue, local currency borrowers may be more likely to choose foreign currency loans. The reason is that in a pooling "equilibrium" these borrowers are not fully charged for the credit risk involved in taking these unhedged loans.

The supply of foreign currency loans should be higher for firms with lower corresponding credit risk, i.e. firms with income in foreign currency, high income to debt ratios and lower distress costs. Following Stiglitz and Weiss (1983) banks may, however, ration foreign currency lending in the face of adverse selection. This could imply that banks supply foreign currency only to clients who are financially transparent and who they know have foreign currency income.

In countries, where forward markets for foreign exchange are not complete, banks may behave averse towards exchange rate exposure on their balance sheet. Luca and Petrova (2008) examine a model of credit dollarization in which risk-averse banks and firms choose an optimal portfolio of foreign currency and local currency loans. In line with other portfolio-choice models of foreign currency debt (Ize and Levy-Yeyati 2003) they predict that banks will offer more foreign currency loans when the volatility of domestic inflation is high and the volatility of the real exchange rate is low. Thus, in countries where the monetary authority has not established a credible reputation for pursuing price stability this could imply that banks

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[3] Banks may not be able to verify the income sources of small, non-incorporated firms which do not keep detailed and audited financial records (Berger and Udell 1998). This information asymmetry may be particularly pressing in countries with weak corporate governance (Brown, Jappelli and Pagano 2008) and for foreign banks which have less knowledge about local firms (Detragiache, Tressel and Gupta 2008).

prefer to make loans in foreign currency. This tendency may be stronger for long-term loans than for short-term loans as long-term monetary policy may be particularly unpredictable.[4]

Banks are typically limited by prudential regulation in the foreign currency exposure they can take. In a country with underdeveloped derivative markets for foreign currency exchange, as in Bulgaria, this regulation implies that banks' supply of loans in foreign currency will be partly determined by their liabilities in these currencies. Basso, Calvo-Gonzalez and Jurgilas (2007) suggest that banks' supply of foreign currency loans will depend on their access to foreign currency debt through financial markets or from parent-banks abroad. Similarly, Luca and Petrova (2008) suggest that increases in banks' access to foreign currency deposits will lead them to offer more foreign currency loans.[5]

Summarizing the theoretical predictions regarding the supply and demand of foreign currency loans, we expect both demand and supply to be higher for firms with foreign currency income, high income in local currency, and lower distress costs in the case of default. Information asymmetries about a firm's income structure may increase foreign currency loan demand but could also reduce its supply. Lenders should be more willing to offer foreign currency loans when they have increased access to foreign currency liabilities in the form of wholesale funds or customer deposits. At the macroeconomic level, firms will be more likely to request foreign currency loans if the interest rate differential between local currency and foreign currency credit is high and the volatility of the exchange rate is low. Low credibility of domestic monetary policy may make banks reluctant to lend in local currency, especially at longer maturities.

2.2   Empirical evidence

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[4] Note that this argument is not identical to that in the "original sin" literature (Eichengreen and Hausmann 1999, Hausmann and Panizza 2003), where it is argued that countries cannot finance themselves long-term in local currency because of moral hazard, i.e. they have the possibility to affect the value of their own currency.
[5] For a discussion of deposit dollarization see De Nicolo, Honohan, and Ize (2005).

Several recent studies examine *aggregate dollarization of credit* in developing and transition countries. Most recently, Luca and Petrova (2008) analyze the aggregate share of foreign currency loans for 21 transition countries of Eastern Europe and the former Soviet Union between 1990 and 2003. They find that the aggregate share of foreign currency loans is positively related to aggregate export activity, interest rate differentials, domestic monetary volatility and deposit dollarization, while it is negatively related to the volatility of the exchange rate. They also find that dollarization is lower in countries with more developed foreign exchange markets, and that credit dollarization is affected by prudential regulations which stipulate tighter open position limits.

Basso, Calvo-Gonzalez and Jurgilas (2007) examine aggregate credit dollarization for 24 transition countries for the period 2000 – 2006. They find that countries in which banks have a higher share of foreign funding display a higher share of loans in foreign currency. Earlier work by Arteta (2002) on a broad sample of low-income countries as well as Barajas and Morales (2003) on Latin America confirms the hypothesis that higher exchange rate volatility reduces aggregate credit dollarization.

Most firm-level studies focus on the *currency denomination of debt for large firms,* using financial statement data. Kedia and Mozumdar (2003) find that large US corporations match loan currencies to those of their sales. Keloharju and Niskanen (2001) find that large Finnish corporations also match loan and income currencies. Moreover, they find evidence that loan denomination is driven by interest rate differentials across currencies. Martinez and Werner (2002) and Gelos (2003) show that large Mexican firms which export, and thus earn foreign currency income, use foreign currency loans as a natural hedge to economic exposure. Benavente, Johnson and Morande (2003) as well as Cowan, Hansen and Herrera (2005) find a similar result for Chilean firms. Allayannis, Brown and Klapper (2003) investigate the debt structure of large East-Asian corporations and find that interest rate differentials as well as

asset type explain the use of foreign currency debt. Cowan (2006) investigating around 500 corporations in half a dozen Latin American countries arrives at similar results.

To our knowledge there is only one paper to date which studies loan currency denomination using *loan-level data*. Brown, Ongena and Yesin (2009) examine the currency denomination of the most recent loan received by 3,105 small firms in 24 transition countries based on responses to the 2005 EBRD *Business Environment and Enterprise Performance Survey*. At the firm level they find strong evidence that the choice of a foreign currency loan is related to foreign currency cash flow. In contrast, they find only weak evidence that foreign currency borrowing is affected by firm-level distress costs or financial opaqueness. At the macroeconomic level the authors find no evidence that interest rate differentials and exchange rate volatility explain differences in foreign currency borrowing in their sample.

In contrast to existing studies, our data allows us to examine to what extent the currency denomination of a loan is determined by the clients and / or the bank. As we observe not only the currency denomination of the actual loan extended, but also the firms' currency requests, we are able to identify how clients' demand for foreign currency loans and the bank's supply of such loans are related to firm characteristics, other loan characteristics, macroeconomic conditions and the bank's liability structure. Finally, our dataset allows us to examine the factors that influence the bank's decision to alter a borrower's currency request gaining insights in the bank's weighing of taking on currency vs. credit risks.

3 Data and Methodology

Our dataset covers all annuity loans, credit lines and overdrafts extended to firms by one Bulgarian bank (henceforth called "the Bank") between April 2003 and September 2007. In total the Bank extended 106,091 loans during this period. For each disbursed loan we have information on the loan conditions requested by the firm, the actual loan conditions granted,

as well as firm characteristics at the time of the loan disbursement. Crucially for our analysis we know whether the loan was requested and/or granted in Bulgarian lev (henceforth we use the currency's ISO 4217 alphabetic code, i.e. BGN) or euro (henceforth EUR). We exclude all observations with missing loan-level or firm-level data leaving us with 105,589 loans to 61,494 different firms. Our dataset also includes monthly indicators of the Bank's liability structure as well as indicators of macroeconomic conditions obtained from the Bulgarian National Bank (BNB) and the International Monetary Fund (IMF). Definitions and sources of all variables are provided in Table 1.

[Insert Table 1 here]

The Bank is a nationwide bank which focuses on lending to small and medium enterprises. Compared to the aggregate banking system, where only 41% of assets are loans to enterprises, 70% of the assets at the Bank are enterprise loans. The volume of outstanding enterprise loans in foreign currency at the Bank equals approximately 40% and hence is similar to that of many retail banks in Central and Eastern Europe. As with the majority of banks in Bulgaria and the rest of the region, foreign strategic investors hold a controlling share in the Bank.[6]

3.1   The Bank's lending technology and loan portfolio

At the heart of the Bank's lending technology is a personnel-intensive analysis of the borrower's debt capacity.[7] A prospective borrower first meets a client advisor who assesses whether the borrower meets the Bank's basic requirements. If this is the case, the client fills in

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[6] In 2007 82% of bank assets in Bulgaria were in the hands of institutions with majority foreign ownership. In Central and Eastern Europe the average share of foreign bank assets in 2007 was 80%.
[7] To gain insights into the usual loan granting process, we have conducted informal interviews with loan officers and training staff from the Bank's head office.

a loan application form. On this form the client indicates her preferred loan amount, maturity and *currency* as well as the purpose of the loan. The client also has to provide information about the firm ownership, other bank relations and the free cash flow available for the repayment of the loan.

In a next step, the Bank's credit administration prepares information on the borrower's credit history with this Bank and other banks.[8] At the same time, the loan officer conducts a financial analysis of the firm including a personal visit to the firm to confirm its financial situation. The loan officer presents the customer's demand and the suggested loan terms together with the information gathered during the financial analysis to the Bank's credit committee, which then makes the final decision on the loan terms granted. Since the borrower's repayment capacity is the core figure in the analysis, loan size (amount and *currency*) and maturity are determined first.

The setting of interest rates and collateral requirements depends on the loan size. For small loans (up to 50,000 EUR) collateral requirements and interest rates are standardized, i.e. not negotiated on an individual basis. For medium-sized loans (above 50,000 EUR) interest rates and collateral requirements are negotiated individually. Given the different lending technologies applied to small versus medium loans we treat these two loan types separately throughout our analysis.

[Insert Table 2 here]

Table 2 provides an overview of the Bank's lending activities during our observation period. Panel A and B display the number and volume of disbursed loans by year. The overwhelming number of loans in our sample (98%) are small loans, i.e. loans with an amount

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[8] Enterprise loans in Bulgaria are covered both by the public credit registry and a private credit bureau (see www.doingbusiness.org).

less than 50,000 EUR. However, considering the volume of lending, medium loans (33%) are of sizeable importance in the Bank's loan portfolio. Panel A shows that almost two-thirds of the Bank's loans are disbursed to repeat clients, i.e. borrowers who take out more than one loan during our observation period. The subsample of loans to *repeat clients* will be important throughout our empirical exercise as it allows us to control for unobserved (time-invariant) firm-level characteristics.

Panel C of Table 2 shows that a substantial share of the Bank's lending is in foreign currency rather than in BGN. Loans denominated in EUR account for 37% of the loan volume disbursed during our observation period.[9] This share decreased considerably between 2003 and 2007, but even at the end of our observation period one-third of the disbursed loan volume was in EUR. Panel C further reveals that the share of EUR loans varies substantially by loan size. EUR loans make up a moderate share of small loans, whereas they dominate medium-sized loans.

As we have information on the firms' requested currency as well as the actual currency of the loan granted, we are able to establish when the requested currency coincides with the granted currency, and how often the Bank changes the loan currency. Figure 1 shows that overall 32% of the loans (23% of the loan volume) disbursed in EUR were loans initially requested in BGN by the borrower. Looking at it from the borrowers' side, 12% of the loan volume which was requested in local currency (69 Mio EUR out of 578 Mio EUR) was actually disbursed in foreign currency. This finding already suggests that a substantial share of foreign currency lending by the Bank is not demand, but supply driven. By contrast, we find that a negligible share of the number and volume of loans disbursed in local currency were requested in foreign currency.

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[9] We focus our analysis on foreign currency loans denominated EUR, since they account for 97.5% of the bank's total foreign currency lending.

[Insert Figure 1 here]

Figure 2 shows that the propensity of firms to request and the Bank to grant EUR loans is strongly related to requested loan size and maturity. The analysis by requested amount in Figure 2A reveals that the share of loans which is requested and granted in EUR actually increases steadily with requested loan size. As this share is very low for loans with requested amounts of up to 5,000 EUR but more than half of the loans fall within this category, we will conduct all our regression analyses not only for the full sample but also for the subsample of loans with requested amounts of more than 5,000 EUR to make sure that our results are not mainly driven by these very small loans. Interestingly, the share of loans requested and granted in EUR is very low for loans with requested maturities of up to 60 months and then increases rapidly. This may be explained by the fact that the housing market in Bulgaria and therefore mortgage loans are predominantly denominated in EUR. We will consider this in our regression analysis and separately study the subsample of non-mortgage loans.

[Insert Figure 2 here]

Figure 2B displays the probability of a firm receiving a loan in EUR conditional on its requested currency, loan size and maturity. The figure shows that the probability to receive a EUR loan after requesting a BGN loan increases steadily with the requested loan size and sharply when the requested maturity exceeds 60 months. By contrast, independent of their requested loan size or maturity, loans requested in EUR are almost exclusively granted in EUR. Only for the very small loans this share is below 90%. The supply analysis will therefore mainly deal with the factors that affect the Bank's decision to switch a request for local currency into EUR.

3.2 The firms' choice of loan currency

We first examine a model in which the dependent variable $\Pr(\textit{EUR requested})_{i,k,t}$ is the probability that a firm i that is taking out a loan k in period t requests a EUR loan:

$$\Pr(\textit{EUR requested})_{i,k,t} = \alpha + \beta_1 F_{i,t} + \beta_2 L_k + \beta_3 M_t + \varepsilon_{i,k,t} \tag{1}$$

In this model $F_{i,t}$ and L_k are vectors of firm characteristics and other requested loan characteristics while M_t is a vector of the macroeconomic conditions at the time of loan disbursement.

Firm characteristics

Based on the theory reviewed in section 2.1 we expect that firms with revenue in foreign currency, higher income levels (and thus higher income to debt service ratios), low distress costs as well as financially opaque firms will be more likely to demand foreign currency loans. Our proxy for foreign currency revenue is the dummy variable *EUR account* which equals one if the firm has a savings or term account in EUR at the disbursement date of the loan, and equals zero otherwise. Our indicator of the firm's income level is the variable *Disposable income* which measures the firm's monthly free cash flow (in log EUR) at loan disbursement. We include two indictors of firm-level distress costs. Our first indicator is *Leverage*, which measures the firm's total liabilities as a share of its total assets. Being highly levered leads to higher distress costs since it is very costly for firms to obtain emergency financing when facing default. Our second indicator of distress costs, *Sole proprietorship*, equals one if the firm is a sole proprietorship and equals zero otherwise. Firms in which the

owner or manager have higher private values of continuing their business also face higher distress costs in the case of default (Froot, Scharfstein and Stein 1993).

We include one indicator for the degree of information asymmetry between the firm and the Bank. The variable *Bank relationship* measures the length of the bank-borrower relationship in months since their first contact. We expect that the Bank can gain private information about the firm's revenue potential by observing the firm's past repayment behavior or it's usage of other bank products.

As larger and older firms are more likely to have export income, less likely to default due to a given foreign currency loan and more likely to be financially transparent than smaller and younger firms, we include the log of total firm *Assets* (measured in EUR) as well as firm *Age* (log of age in years) as firm-level control variables.

To capture remaining differences in firm characteristics our regressions contain seven *Industry dummies*, which indicate the industry of the firms' main activity and 33 *Branch dummies* which capture the location of the branch where the firm applied for the loan.[10] In particular, the industry and branch dummies control for potential foreign currency earnings since foreign currency income is more likely in certain industries (e. g. trade, tourism or transport) and locations (trade and tourist centers such as Sofia or Varna).

Other loan terms

Other requested loan terms, such as loan size and loan maturity may affect the firms' currency request in both directions. As argued by Brown, Ongena and Yesin (2009) firms with higher income-to-debt burdens are less likely to risk default due to exchange rate changes. Thus firms with larger loans and shorter maturities (and therefore ceteris paribus higher installments) may be less likely to borrow in foreign currency. However, the risk of

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[10] As we do not have information on the location of the firm we use the available information on branch location.

experiencing sharp exchange rate fluctuations may be lower for shorter loans, suggesting that firms with shorter loans might as well be more likely to borrow in foreign currency. Similarly, firms with larger loans might be more likely to borrow in foreign currency since the absolute interest rate advantage of borrowing in foreign currency is higher for larger loans. To control for these effects we include *Requested amount* and *Requested maturity* which measure the log of the requested loan amount (measured in EUR) and the log of the requested loan maturity (in months) respectively.

The dummy variable *Mortgage loan* equals one if the loan is collateralized by a mortgage, and equals zero otherwise. Since the underlying property may be liquidated in case of default, distress costs (e.g. the volume of required emergency funding) may be lower for these loans. Moreover, as the Bulgarian real estate market is mainly denominated in EUR, firms should be more likely to request loans that finance real estate in EUR.

Macroeconomic conditions

Based on existing theory we expect that firms are more likely to request foreign currency loans if the interest rate differential on foreign currency loans is high, expected exchange rate volatility is low and domestic inflation volatility is high. In our analysis of firms' currency choices we control for the prevailing monetary conditions at the time of loan disbursement[11] with three indicators based on data obtained from the Bulgarian National Bank and the International Monetary Fund.

For each month during our observation period we calculate the *Interest differential* by subtracting the (12-24 month) household deposit rate in EUR from the deposit rate in BGN.

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[11] The firm's request for a loan and thus the currency choice is naturally prior to the date of loan disbursement. Since the Bank's loan granting procedure is well established and clear-cut, the time span between loan application and disbursement is normally short and macroeconomic conditions should not have changed considerably in the meantime.

We use this deposit based measure of interest rate differentials rather than a measure based on interbank rates because the interbank market plays a minor role in funding banks in Bulgaria.

Our measure of expected exchange rate volatility is the dummy variable *EU announcement* which is one for all loans disbursed after the announcement (on 26 September 2006) that Bulgaria would definitely join the EU in January 2007. As a new accession country to the EU, Bulgaria was from that date on committed to joining the euro zone at some future date, which may have lowered expected exchange rate volatility.[12]

We measure *Inflation volatility* as the variance of monthly changes in the consumer price index over the twelve months prior to the month in which the loan was disbursed. Finally, we expect that the demand for foreign currency loans at the Bank may depend on the possibilities of firms getting similar loans at other banks.

We control for the firms' possibilities to obtain foreign currency loans from alternative providers with the variable *Aggregate FX loans* which measures in each month the share of corporate loans in the entire Bulgarian banking system which are denominated in foreign currency.

3.3   The Bank's choice of loan currency

Our dependent variable $\text{Pr}(EUR\ granted)_{i,k,t}$ is the probability that the Bank grants a loan k to firm i in period t in EUR rather than BGN. In our empirical model the vectors L_k, $F_{i,t}$ and M_t again include firm and loan characteristics as well as indicators of macroeconomic

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[12] Bulgaria introduced a currency board in July 1997 which fixed the exchange rate towards the EUR. This currency board held throughout our observation period, so that there was almost no actual exchange rate volatility. However, this by no means implies that firms or banks in Bulgaria were confident that a depreciation of the BGN would not happen. Indeed, Carlson and Valev (2008) report survey evidence suggesting that in 2004 14% of the Bulgarians believed the currency board might collapse with a sharp devaluation within the next twelve months. Considering a period of five years more than 25% of respondents expected the currency board to collapse with a sharp devaluation.

conditions, while the vector B_t captures indicators of the Bank's funding structure at the time when a loan is disbursed.

$$\Pr(EUR\ granted)_{i,k,t} = \alpha + \beta_1 F_{i,t} + \beta_2 L_k + \beta_3 M_t + \beta_4 B_t + \varepsilon_{i,k,t} \qquad (2)$$

As discussed in section 2.1, the Bank's decision to grant a loan in local or foreign currency will depend on the expected credit risk for either type of loan. We use our above mentioned indicators *EUR account*, *Disposable income*, *Leverage*, *Sole proprietorship*, *Bank relationship*, *Assets*, *Age*, *Mortgage loan* as well as the *Industry dummies* and *Branch dummies* to control for observable firm-level credit risk.

Existing theory predicts that banks will offer more foreign currency loans when the volatility of the real exchange rate is low and the volatility of domestic inflation is high. To capture this we include the variables *EU announcement* and *Inflation volatility*. If banks do mistrust domestic monetary policy they will be more hesitant to grant large and especially long-term loans in local currency. We therefore include the <u>requested</u> loan terms (*Requested amount*, *Requested maturity*) as explanatory variables in our supply regression.[13]

We expect increased access to foreign currency funding to lead to more foreign currency loans. To control for the level and the potential composition effect of the Bank's foreign currency liabilities, we introduce two bank funding variables. *EUR wholesale funding* measures the Bank's funding sourced from financial institutions or capital markets denominated in EUR as a share of its total liabilities. *EUR customer funding* measures the Banks' funding obtained from customer deposits denominated in EUR as a share of its total

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[13] As described in section 3.1, the Bank's currency decision is jointly determined with the loan amount and loan maturity. To circumvent the endogeneity of the loan currency to the granted loan amount and loan maturity we use the predetermined requested loan size and maturity.

liabilities. Both indicators of the Bank's funding structure are calculated using balance sheet information from the month prior to a loan disbursement.

The Bank's currency decision should further depend on the mark-up it can earn by lending in either currency. We therefore include the variable *Spread differential* which measures the difference between the intermediation spread in EUR and BGN. The intermediation spreads are calculated as the short-term lending rates minus the household term deposit rates in EUR or BGN respectively. Finally, we include the variable *Aggregate FX loans*, which captures the share of foreign currency loans to corporate borrowers in the entire banking system as a measure the competition the Bank faces in the foreign currency loan market.

3.4   Summary statistics

Table 3 provides summary statistics for our explanatory variables. The table shows that firms in our sample are predominantly sole proprietorships with mean assets of less than 60,000 EUR and an average age of less than ten years. The loans they receive are on average smaller than 10,000 EUR, with no loan in the sample exceeding 1 million EUR. The average loan maturity is less than three years, while the maximum maturity is twenty years.

[Insert Table 3 here]

The summary statistics for the macroeconomic conditions show that the *Interest differential* was positive throughout our observation period confirming that firms did have a cost-incentive to demand EUR loans. The *Spread differential* between EUR and BGN funds ranged from -2.4% to 2.1% during our observation period suggesting no clear pattern which currency was more profitable for banks. The variables *EUR wholesale funding* and *EUR customer funding* show that a substantial share of the Bank's funding is in foreign currency.

Not surprising for a bank with a strategic foreign investor, wholesale funding in EUR is twice as important as retail funding in EUR.

4 Results

4.1 Univariate tests

The characteristics of those firms which request local currency loans differ strongly from those which request foreign currency loans. Columns (1) and (2) of Table 4 display sample means by requested currency, while column (3) displays results of difference tests between the two sub-samples for each variable. The table supports the hypothesis that firms which request foreign currency loans are more likely to have foreign currency income (*EUR account*) and have lower distress costs (not *Sole proprietorship).* We also find that firms which request EUR loans have higher income (*Disposable income*), are more transparent towards the bank (*Bank relationship*), and are larger (*Assets*) and older (*Age*).

Firms which request EUR loans also differ from firms requesting BGN loans concerning other loan terms. They request larger loans (*Requested amount*), longer-term loans (*Requested maturity*) and are more likely to request a *Mortgage loan*. These findings suggest that rather absolute interest rate advantages (on large loans) and the anticipation of the Bank's reluctance to provide long-term loans in local currency may be driving requested loan currency.

At the macroeconomic level we find that firms are more likely to request EUR loans in months when the *Interest differential* is higher. Surprisingly, we find that firms are less likely to request EUR loans after the *EU announcement*, suggesting that this announcement may have not only reduced expected exchange rate volatility, but also increased the credibility of future domestic monetary policy. Finally, we find that the Bank's liability structure (*EUR wholesale funding, EUR customer funding*) has little impact on the firms' currency requests.

In Table 4 we also report univariate tests comparing those firms which were *granted* foreign currency loans to those which were granted BGN loans. Columns (4-6) present statistics and tests for loans requested in BGN, while columns (7-9) present statistics and tests for loans requested in EUR.

From columns (4-6) we see that the Bank's decision to alter the loan currency from BGN to EUR seems to be correlated with lower observable credit risk and greater financial transparency of the firm (*EUR account, Disposable income, Bank relationship, Assets, Age*). However, we also see that in those instances where the Bank altered the currency from BGN to EUR, the requested loan amount and maturity are higher than in the those cases where BGN was granted. While the first observation (larger requested amount) may be in line with the firms' objective of achieving greater (absolute) interest savings, the longer maturity for loans switched to EUR suggests that the Bank may be shifting exchange rate risk to its clients.

Comparing the macroeconomic conditions and bank-funding at the time when loans are disbursed, we find that the Bank is more likely to switch a loan from BGN to EUR after the *EU announcement* and when the *Spread differential*, i.e. its earnings on intermediating EUR funds, is higher. Moreover, we find that the Bank is more likely to switch a loan from BGN to EUR in periods where it has more funding in EUR from depositors *(EUR customer funding)* and less EUR financing from financial institutions or the capital market (*EUR wholesale funding*).

For firms which request EUR, columns (7-9) of Table 4 show that firms which are switched to BGN can be characterized by higher credit risk and lower financial transparency. These firms are smaller, have less disposable income, are more often sole proprietorships and

have shorter relationships with the Bank than firms who requested and received EUR. Confirming our findings above, in cases where the Bank alters loan currency from EUR to BGN the requested loan size is smaller and the requested maturity is shorter.

4.2   Multivariate regressions: The firms' choice of loan currency

Table 5 displays our regression results for firms' decisions to request foreign currency (EUR) rather than local currency (BGN) loans based on estimations for both the full sample and the panel of repeat clients. All estimations include industry and branch dummies. Standard errors are presented in brackets and for regressions with the full sample are adjusted for clustering at the industry-branch level. Estimations for repeat clients include firm-level random effects to account for unobserved firm heterogeneity.[14]

[Insert Table 5 here]

Full sample effects of firm-, loan- and macroeconomic variables

Column (1) of Table 5 presents marginal effects from a logit estimation for the full sample. The results confirm our main hypotheses: firms are more likely to request EUR loans if the interest rate advantage on EUR loans is higher, if they have foreign income, and if they have lower distress costs.

The request for a foreign currency loan is positively related to our indicator of foreign currency revenue, *EUR account*. Also, the impact of firm-level distress costs is in line with theoretical predictions. Firms with higher potential distress cost (higher *Leverage*, *Sole*

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[14] We use firm random effects rather than fixed effects so as not to exclude the firms which request the same currency for each of their loans. In our analysis of the subsample of repeat clients we drop *Age* as it increases parallel to *Bank relationship* over a sequence of several loans.

proprietorship) are less likely to demand EUR loans. Further supporting this result we find that larger firms (higher *Assets*) are more likely to demand foreign currency loans.

Contrary to our expectations, firms with higher debt-service to income ratios (lower *Disposable income* and higher *Requested amount*) are more likely to demand foreign currency loans. An explanation for this result could be that firms with lower disposable incomes are less able to afford the higher interest rates on local currency loans, and that the *absolute* interest rate savings from borrowing in foreign currency increases with loan size.

Our results do not support the conjecture that opaqueness in the bank-firm relationship encourages (local currency earning) firms to request foreign currency loans. The significantly positive coefficient of *Bank relationship* suggests that more transparent firms (to the Bank) are more likely to request a foreign currency loan. This finding confirms the results of Brown, Ongena and Yesin (2009) and may be explained by firms' anticipation that banks may only offer foreign currency loans to firms they know well.

Our *Industry dummies* show that firms operating in industries that are likely to have foreign currency earnings such as trade, transport and tourism display a larger likelihood to request EUR loans than borrowers from other industries like services or agriculture (not reported in the table). This provides further evidence that foreign currency income increases a firm's likelihood to request a foreign currency loan. The *Branch dummies* (not reported in the table) confirm these findings showing that firms located in Sofia as well as in the touristic and industrial centers of the country (e.g. Varna, Burgas, Ruse) are more likely to request EUR loans than firms in other areas.

We find that firms with a longer *Requested maturity* are more likely to request foreign currency loans. This result is surprising, given that the risk of adverse exchange-rate movements is likely to be higher in the long run. One explanation for this finding is that firms anticipate that the Bank may be reluctant to offer long-term loans in local currency. Also,

longer-term loans may be particularly used for financing real estate, a market which is mainly transacting in EUR. This is confirmed by the finding that firms requesting a *Mortgage loan* are more likely to request EUR.

At the macroeconomic level we find that firms are more likely to request EUR loans when the *Interest rate differential* is higher. However, we do not find that lower expected exchange rate volatility as measured by *EU announcement* increases foreign currency loan demand. This result may be driven by the fact that the announcement to join the EU also stabilized expectations about domestic monetary policy. While *Inflation volatility* does not influence currency requests, the possibility to get foreign currency loans from other financial institutions (*Aggregate FX loans*) reduces firms' likelihood to request EUR loans at this Bank.

Subsamples of *loans with amount over 5,000 EUR*, *medium loans* and *non-mortgage loans*

Our descriptive statistics in Table 2 show that small loans (below 50,000 EUR) make up the overwhelming share (98%) of our observations. As discussed in section 3.1, loans of this size are standardized products with fixed loan conditions (interest rate, collateral requirements). Thus, foreign currency demand among small loans may not only be driven by firm characteristics, but also by the expectations of entrepreneurs that they do not meet the Bank's fixed criteria for such loans. As a result, the full-sample results presented in column (1) may be dominated by the large number of small loans, for which firm characteristics, other loan terms and macroeconomic conditions may have less influence on requested currency. Column (2) of Table 5 therefore displays results for the subsample of medium loans (above 50,000 EUR) only. The results in this column reveal that a firm's foreign currency income (*EUR account*) and distress costs (*Leverage*, *Sole proprietorship*) as well as the macroeconomic environment (with the exception of the *EU announcement*) do not play a role in the currency decision of firms requesting medium loans. By contrast, the effects of firm

transparency, size and income (*Bank relationship*, *Assets*, *Disposable income*) as well as other requested loan terms (*Requested amount*, *Requested maturity*) are stronger when only considering medium loans. We conclude that while our quantitative results vary for several explanatory variables, our qualitative results from the full-sample regressions seem to be robust for both loan types.

Figure 2 shows that firms hardly request foreign currency when they want loans with a volume below 5,000 EUR. The full-sample results presented in column (1) of Table 5 may thus be weakened by the large share of such loans in our sample. Column (3) of Table 5 examines whether the determinants of requested loan currency differ for the subsample of loans with amounts over 5,000 EUR. The results displayed in this column confirm those of our full-sample qualitatively. However, the economic effect of all explanatory variables is stronger confirming our conjecture that the full sample results are somewhat weakened by the large number of very small loans.

Figure 2 further shows that long-term loans (loans exceeding 5 years in maturity) have a high probability to be requested and granted in EUR. These long-term loans are to a large extent mortgage loans. Thus the observed relation between maturity and foreign currency denomination of loans may be driven by the fact that the Bulgarian housing market is denominated in EUR. Column (4) displays regression results for the subsample of non-mortgage loans and shows that the majority of previous findings also qualitatively hold in this subsample. However, as conjectured we find that *Requested maturity* does not seem to influence the firms' currency request when we exclude mortgage loans.

First loans versus *later loans* of repeat clients

Firms' anticipations about the willingness of the Bank to provide foreign or local currency loans may influence their requested loan currency. This raises doubts about whether our data

allows us really to analyze the firm's "pure" demand for foreign currency loans at all. Our full sample results in column (1) actually suggest that the loan currency request by firms may be partly driven by their anticipation of the Bank's behavior: This may explain why more transparent firms and firms with longer requested maturity are more likely to request foreign currency loans.

We use our panel data of repeat clients to study whether "anticipation effects" may be driving the requested loan currency of firms. We conjecture that anticipation effects should be stronger if the firm is actually familiar with the Bank's loan supply behavior. If this is the case we should see differences in the determinants of requested loan currency for the first loan of a firm compared to its later loans with the Bank. In columns (5) and (6) of Table 5 we examine whether the determinants of requested loan currency differ between first loans and later loans for our panel of repeat clients. The two columns present estimates from a single OLS estimation,[15] with the main effects of all explanatory variables reported in column (5) and interaction terms with *Later loan* reported in column (6).

The interaction terms in column (6) suggest that the anticipation effect may affect our results for loan characteristics more than those for the firm characteristics and macroeconomic conditions. The interaction terms of *Later loan* with *Requested maturity* and *Mortgage loan* are significantly positive suggesting that firms learn over time that longer-term and mortgage loans are more likely to be granted in foreign currency. This learning effect is especially strong for the maturity request because *Requested maturity* does not at all influence a firm's currency request at the first loan. In contrast, besides a weaker effect for our indicator of firms' foreign currency earnings and a stronger effect for firm size, there are no significant differences in the firm-level and macroeconomic determinants of requested loan currency between first and later loans.

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[15] We resort to OLS estimation because of the difficulties in interpreting marginal effects of interaction terms in non-linear models (Ai and Norton 2003).

4.3 Multivariate regressions: The Bank's choice of loan currency

Tables 6 and 7 report our results for the Bank's currency decision. We observe the Bank's currency decision both for those loans which were requested in foreign currency (EUR) and for those which were requested in local currency (BGN). We can therefore examine the Bank's currency choice conditional on the firms' requested currency. As Figure 1 shows, a substantial share of loans which firms request in BGN are switched by the Bank to EUR, while few loans requested in EUR are switched to BGN. Our attention is therefore focused on those loans which are requested in BGN. Here we want to identify the firm-, bank- and macro-level drivers behind the Bank's switching of loans to foreign currency (EUR).

[Table 6 here]

Table 6 reports our analysis of the Bank's currency choice for loans requested in BGN. Panel A reports baseline results for the full sample and the sample of repeat clients. The instrumental variable analysis presented in Panel B accounts for the possible endogeneity of the Bank's refinancing structure.

Column (1) of Panel A displays our results for our full sample of loans requested in local currency. We find that the Bank's currency decision to offer EUR is related to indicators of observable credit risk. The Bank is more likely to grant a EUR loan to firms which have foreign currency income (*EUR account*), are not a *Sole proprietorship* and which are larger (*Assets*).

The *Requested amount*, *Requested maturity* and purpose of the loan (*Mortgage loan*) strongly affect the Bank's currency decision. The fact that mortgage loans are more likely to be granted in EUR may be related to lower credit risk, as the collateral of these loans (houses, which as mentioned above are transacted in EUR) is denominated in EUR. The fact that large

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loans and loans with longer maturity are more likely to be granted in EUR provides support for our conjecture that the Bank may not trust (future) domestic monetary policy.

Our full sample results suggest, importantly, that the Bank is more likely to switch loans from BGN to EUR when its share of liabilities in foreign currency (*EUR wholesale funding*, *EUR customer funding*) is higher. We find that the economic magnitude and significance of customer funding in foreign currency is greater than that of wholesale funding in foreign currency. This finding contradicts common wisdom that foreign currency borrowing in Eastern Europe is strongly driven by EUR wholesale funding of subsidiaries by their parent banks and international financial institution (e.g. the EBRD). Rather, our findings suggest that the "dollarization" of customer deposits is a key driver of foreign currency lending.

Considering the actual macroeconomic conditions during our observation period we find that the Bank's decision to switch loans from local currency to foreign currency is positively related to perceived exchange rate stability (*EU announcement*). By contrast, current domestic *Inflation volatility* does not lead the Bank to lend more in foreign currency. We further find that the Bank's lending behavior is partly related to competitive conditions. While lending in EUR is unrelated to the intermediation spread on foreign versus local funds (*Spread differential*), the Bank does grant less loans in EUR when the share of loans in the entire banking sector is higher (*Aggregate FX loans*).

Columns (2-4) of Panel A report results for the subsamples of Medium loans, loans exceeding 5,000 EUR and Non-mortgage loans. The results presented in these columns largely confirm our full-sample results. One notable difference for the subsample of Medium loans (column 2) is that the firm-level indicators of income, distress costs and transparency are not significant. This result is seems to be driven by the substantially lower number of observations in this specification. One notable result from column (4) is that, even when we

exclude the sample of mortgage loans, the Bank is more likely to switch large and long-term loans from local to foreign currency.

Column (5) reports panel results for our sample of repeat clients, again confirming the qualitative results from our full sample. Most notably, we find that the effect of customer funding in EUR is still positive in our panel analysis. Thus if the same client approaches the Bank at different times, in both instances asking for a loan in local currency, the Bank is more likely to switch the loan to foreign currency if it has more foreign currency deposits.

Could our finding that the Bank's funding in foreign currency is positively correlated with its lending in foreign currency be driven by reverse causality? We believe that our findings are not subject to endogeneity bias because Panel A in Table 6 examines the probability of the Bank offering a foreign currency loan to clients who <u>requested a loan in local currency</u>. It is therefore unlikely that the correlation between funding and lending is driven by firms' demand for foreign currency loans.

To rule out potential endogeneity of foreign currency funding, we nevertheless conduct an instrumental variable analysis. We conjecture that wholesale funding in foreign currency is more likely to be endogenous to the demand for foreign currency loans than customer deposits, which were shown to be sluggish.[16] We therefore instrument our variable EUR wholesale funding with the spread on sovereign debt of Bulgaria (denominated in EUR) over that of Germany. As shown by (Durbin and Ng 2006) the sovereign spread affects the cost of international funding for domestic enterprises (including banks) and therefore should affect the incentives of our Bank to borrow wholesale in EUR. At the same time the sovereign spread of Bulgaria (on its EUR debt) should not be related to the demand for EUR loans by small firms in the country. The results presented in Panel B of Table 6 confirm our result that

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[16] The "sluggishness" of retail deposits is a well-established stylized fact (Song and Thakor 2007).

Bank funding in foreign currency has a positive impact on Bank lending in foreign currency, and that this effect is stronger for customer than for wholesale funding.

[Table 7 here]

Table 7 examines the Bank's currency choice for those firms which request a loan in foreign currency (EUR). Confirming our results in Table 6 we find that the Bank is more likely to grant a EUR loan to those clients that display lower credit risk (more *Assets,* not *Sole proprietorship*) and want long-term (*Requested maturity*) or *Mortgage loans*. By contrast, we find little evidence that lending in foreign currency to clients that request foreign currency is driven by macroeconomic conditions or bank funding.

4.4   Switching loan currency and credit risk

Figure 1 shows that nearly one-third of the foreign currency loans of the Bank were initially requested in local currency. Our results from Table 6, column (4) suggest that this finding is partly driven by the Bank's reluctance to lend large amounts for longer maturities in local currency and by matching of the currency structure of its assets to that of its liabilities. In Table 8 we examine what this implies for the quality of those loans which are switched from local to foreign currency. Comparing those EUR loans which were requested in BGN to those which were requested in EUR we examine whether the bank consciously takes on greater credit risk by switching the currency of loans.

Unfortunately we do not have precise indicators of the ex-post performance of the loans in our sample. Moreover, given that the currency board of the BGN to the EUR held throughout our observation period, there can be no exchange-rate induced defaults on foreign currency loans. However, we can assess the ex-ante credit risk associated with each loan by examining

the pricing behavior of the bank. If loans which are switched from BGN to EUR involve a higher default probability we should find that the Bank charges a higher risk premium and thus a higher interest rate on these loans than on otherwise identical loans, which were requested in EUR. Note that we can conduct this exercise for medium loans only, as small loans from the Bank are granted at standardized interest rates.

[Table 8 here]

Table 8 examines the pricing of medium loans denominated in EUR, relating the nominal interest rate to firm characteristics, *actual* loan terms (*Amount, Maturity, Annuity loan, Mortgage loan*) and the requested currency (*BGN requested*). In all specifications we control for macroeconomic conditions and bank-funding with year-quarter fixed effects. The baseline results reported in column (1) for all clients confirm that the bank does practice risk adjusted pricing for the segment of medium loans. Firms which are more likely to have foreign income (*EUR account*), are more transparent (not *Sole proprietorship, Bank relationship*) and are larger (*Assets*) pay lower interest rates on EUR loans. Firms with larger loans and shorter maturities also pay lower interest rates, while mortgage loans carry higher interest rates. The repayment schedule (*Annuity loan*) does not seem to affect pricing. These findings are confirmed by panel results for our subsample of repeat clients in column (2).

For the full sample and the panel of repeat clients, we find that firms with loans which were switched from BGN to EUR pay significantly higher interest rates than firms with loans which were requested and granted in EUR. The results in columns (1) and (2) suggest that loans with switched currency have on average 12-18 basis points higher rates. At first sight, this effect appears small compared to the average interest rate of 10.2% for this sub-sample, as well as to the dispersion of interest rates for this sample which varied depending on year-

quarter between 500 and 600 basis points. However, the difference is similar in magnitude to the effect on interest rates of other unfavorable firm characteristics such as being a *Sole proprietorship* or not having a foreign currency account (*EUR account*).

The pricing of loans which were switched from BGN to EUR suggests that by offering these loans in foreign currency the Bank may be exposing the firm to higher default risk and itself to higher credit risk. However, higher interest rates for switched loans may also be explained by market power and bargaining by the Bank. During our observation period, interest rates on medium loans in BGN are on average 38 basis points higher than interest rates on medium loans in EUR. As firms which requested loans in BGN were prepared to pay the higher interest rate, the Bank may be simply reaping part of the "saved interest expenses" for the firm by charging higher interest on switched loans.

In column (3) of Table 7 we examine whether the higher interest rate on switched loans may be explained by market power of the Bank rather than higher credit risk. To this end, we include not only the main term of *BGN requested* but also its interaction term with the variable *Interest differential*, which captures the (risk-free) difference in local currency and foreign currency interest rates. If market power alone explains the higher pricing of switched loans we should find that the mark-up of the Bank on switched loans is higher in months when the interest differential between BGN and EUR funds is higher. Thus we would expect the interaction term of *BGN requested * Interest differential* to be significantly positive. The results in column (3) show, however, exactly the opposite. We find that the main effect of BGN requested remains significant and positive while the interaction term *BGN requested * Interest differential* is not significant at all. We conclude therefore that the higher relative pricing of loans which are switched from BGN to EUR reflects higher default and credit risk rather than bargaining by the Bank.

5 Conclusions

In this paper we examine the currency denomination of loans extended to small firms by one retail bank in Bulgaria. Our analysis is based on credit file data for 105,589 loans over the period 2003-2007. In contrast to existing studies, our data allows us to disentangle demand and supply side drivers of the currency denomination of loans. We observe not only the actual currency denomination of the loan extended, but also the loan currency that was requested by the firms in their loan application. We can therefore identify how clients' demand for foreign currency loans and the Bank's supply of such loans are related to firm characteristics, other loan terms, macroeconomic conditions and the Bank's liability structure. Our results suggest that foreign currency borrowing in Eastern Europe is at least partly supply-driven, with banks hesitant to lend long-term in local currency and eager to match the currency structure of their assets and liabilities.

Our results have implications for policy makers throughout Eastern Europe who have recently taken measures to discourage foreign currency borrowing in the retail sector (Rosenberg and Tirpak 2008). In Hungary, Poland and Latvia, for example, banks are now forced to disclose the exchange rate risks involved in foreign currency borrowing and have had to tighten eligibility criteria for such loans. In Romania and Croatia, on the other hand, supervisory authorities have imposed stronger provisioning requirements on foreign currency compared to local currency loans. As we find that foreign currency borrowing in Emerging Europe seems to be driven by both demand and supply factors, measures that address only one of these sides may not be enough to curb foreign currency borrowing.

Our results suggest that wholesale foreign currency funding of banks in Eastern Europe is not the key driver of foreign currency lending in the region. We find that foreign currency deposits by customers have a much stronger impact on foreign currency lending of our Bank. This finding suggests that recent proposals to foster local currency wholesale funding in

Eastern Europe may not be sufficient to reduce foreign currency lending.[17] Instead, credible macroeconomic policies which encourage customers to save in local currency may be more promising. A credible macroeconomic environment would also make banks less hesitant to extend large and long-term loans in local currency.

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[17] The President of the EBRD, Thomas Mirow, highlighted this proposal in a speech at the 2010 joint conference of the IIF and EBRD on Financial Systems in Emerging Europe in Zagreb (http://www.ebrd.com/pages/news/speeches/mirow_100513.shtml).

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Figure 1. Requested vs. granted loan currency

This figure displays share of requested and granted loan currencies in number of loans and volume of loans disbursed.
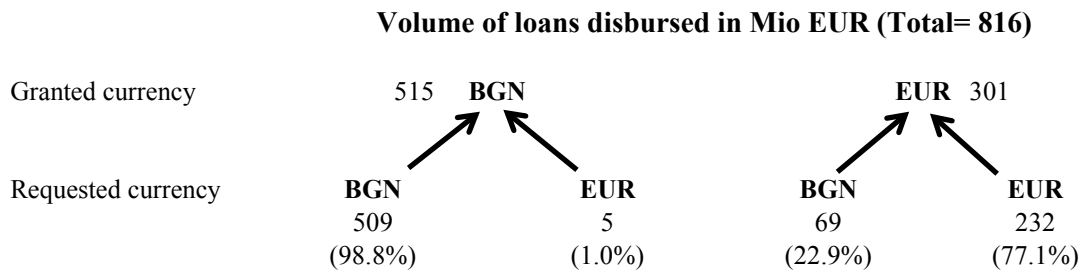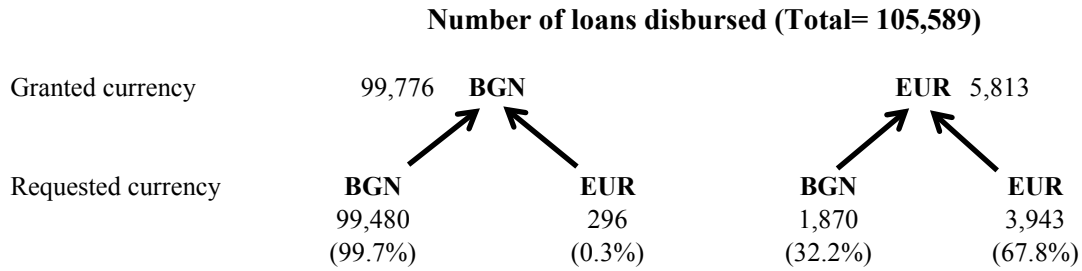
Number of loans disbursed (Total= 105,589)

Granted currency	99,776 **BGN**		**EUR** 5,813	
Requested currency	**BGN**	**EUR**	**BGN**	**EUR**
	99,480	296	1,870	3,943
	(99.7%)	(0.3%)	(32.2%)	(67.8%)

Volume of loans disbursed in Mio EUR (Total= 816)

Granted currency	515 **BGN**		**EUR** 301	
Requested currency	**BGN**	**EUR**	**BGN**	**EUR**
	509	5	69	232
	(98.8%)	(1.0%)	(22.9%)	(77.1%)

Figure 2. Requested and granted currency by loan size and maturity

Figure 2A. Share of loans requested and granted in EUR
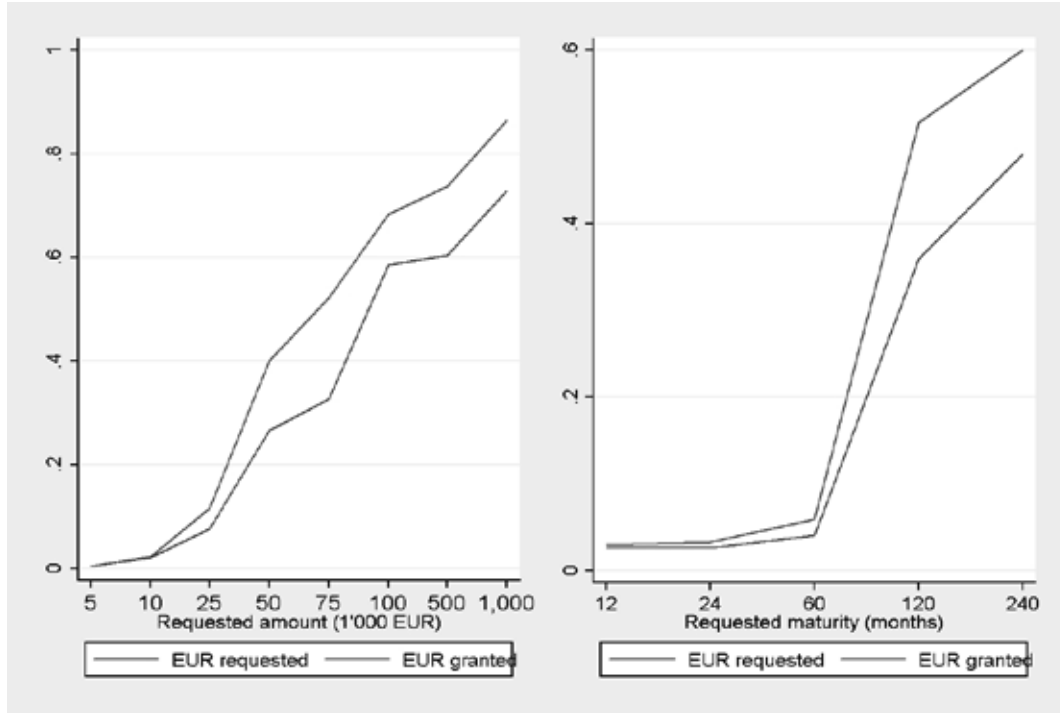
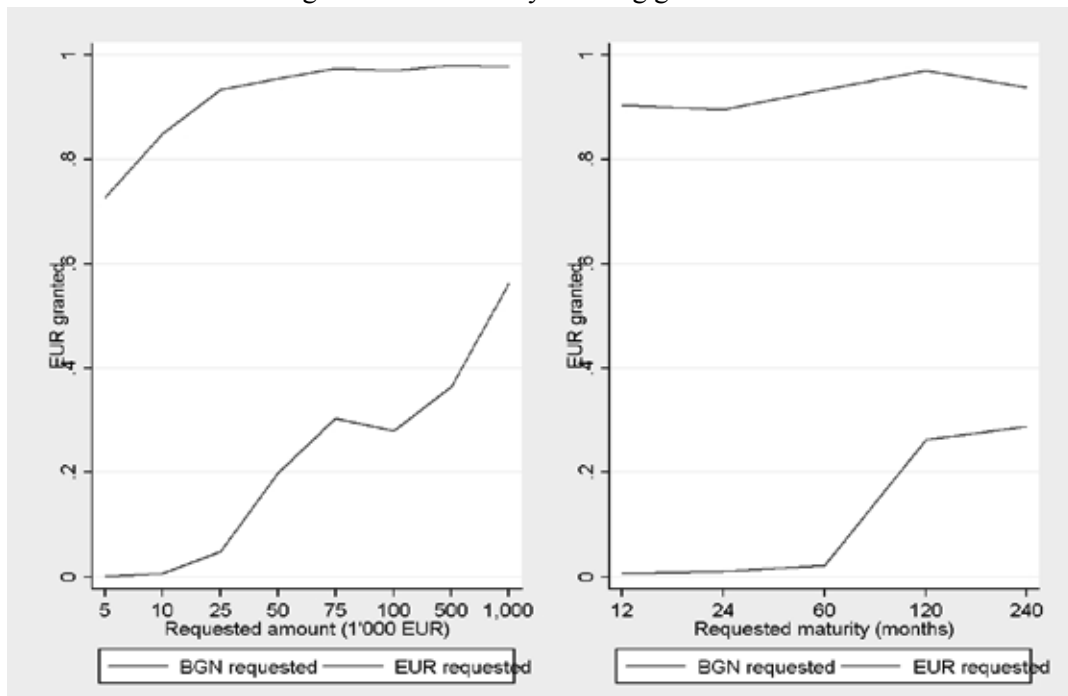Figure 2B. Probability of being granted EUR

Table 1. Variable definitions and data sources

Sources: IFS: International Financial Statistics of the International Monetary Fund. BNB: Bulgarian National Bank.

Variable	Definition	Unit	Source
Dependent variables			
EUR requested	Firm requested EUR loan (1=yes, 0=no)	1/0	Bank
EUR granted	Bank granted EUR loan (1=yes, 0=no)	1/0	Bank
Firm characteristics (at loan disbursement date)			
EUR account	Firm holds EUR savings or term account (1=yes, 0=no)	1/0	Bank
Disposable income	Total disposable income per month	log EUR	Bank
Leverage	Total debt as share of total assets of firm	%	Bank
Sole proprietorship	Firm is sole proprietorship (1=yes, 0=no)	1/0	Bank
Bank relationship	Time since first contact between bank and client	months	Bank
Assets	Total assets of firm	log EUR	Bank
Age	Firm age	log years	Bank
Industry	Industry dummies which are one if firm belongs to one of the following sectors: Construction, Manufacturing, Trade, Transport, Tourism, Other services. Baseline industry is Agriculture	1/0	Bank
Loan characteristics			
Requested amount	Requested loan amount	log EUR	Bank
Requested maturity	Requested loan maturity	log months	Bank
Mortgage loan	Loan is a mortgage loan (1=yes, 0=no)	1/0	Bank
Amount	Granted loan amount	log EUR	Bank
Maturity	Granted loan maturity	log months	Bank
Annuity loan	Loan is an annuity loan *vs.* credit line or overdraft (1=annuity, 0=credit line or overdraft)	1/0	Bank
Interest rate	Interest rate per annum	%	Bank
Later loan	Loan is non-initial loan for repeat clients (1=yes, 0=no)	1/0	Bank
Branch	Branch dummies which equal 1 for the branch that granted the loan	1/0	Bank
Macroeconomic conditions (in month of loan disbursement)			
Interest differential	Household deposit rate (12–24 months) in BGN minus rate in EUR	%	BNB
Spread differential	Intermediation spread (short-term lending rate minus household deposit rate) in EUR minus spread in BGN	%	BNB
EU announcement	Loan was extended after the official announcement (26 September 2006) that Bulgaria would definitively join the EU in January 2007 (1=yes, 0=no)	1/0	Bank
Inflation volatility	Variance of monthly changes in the consumer price index over 12 months prior to beginning of the quarter in which loan is disbursed	%	IFS
Aggregate FX loans	Share of foreign currency loans to corporations in total banking system	%	BNB
Bank funding (at end of month prior to loan disbursement)			
EUR wholesale funding	EUR non-customer funding as share of bank's total liabilities	%	Bank
EUR customer funding	EUR customer funding (deposits) as share of bank's total liabilities	%	Bank

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Table 2. Loan disbursements

This table displays statistics on the bank's loan portfolio. Results are provided for the full sample and the following subsamples: *Small loans*: Loans with an amount up to 50,000 EUR. *Medium loans*: Loans with an amount over 50,000 EUR. *Repeat clients*: Loans disbursed to firms that take out more than one loan from the bank during the observation period.

Panel A. Number of loans disbursed

	Full sample	Small loans	Medium loans	Repeat clients
2003	10,780	10,564	216	7,571
2004	18,643	18,261	373	14,296
2005	23,243	22,706	537	17,759
2006	28,269	27,670	599	18,642
2007	24,663	24,160	503	11,025
Total	105,589	103,361	2,228	69,293

Panel B. Volume of loans disbursed (in million EUR)

	Full sample	Small loans	Medium loans	Repeat clients
2003	69	43	26	49
2004	123	78	46	96
2005	189	121	67	145
2006	222	153	69	161
2007	213	153	60	118
Total	816	547	269	569

Panel C. Share of loan volume disbursed in EUR (%)

	Full sample	Small loans	Medium loans	Repeat clients
2003	44.0	23.8	76.9	44.7
2004	42.2	21.1	78.3	42.0
2005	37.6	16.3	76.0	36.9
2006	34.3	15.4	75.8	37.4
2007	33.6	19.0	70.7	42.4
Total	36.9	18.1	75.2	39.7

Table 3. Descriptive statistics

This table reports summary statistics for all explanatory variables. See Table 1 for definitions and sources of the variables. For all log-transformed variables the statistics are calculated by using the original values.

	N	Mean	Minimum	Maximum
Firm characteristics				
EUR account	105,589	0.01	0	1
Disposable income	105,589	850	0	1,154,455
Leverage	105,589	0.15	0	1
Sole proprietorship	105,589	0.90	0	1
Bank relationship	105,589	9.86	0	71
Assets	105,589	57,528	2	12,835,983
Age	105,589	8.45	0	107
Loan characteristics				
Requested amount	105,589	8,671	51	1,700,000
Requested maturity	105,589	32	1	240
Mortgage loan	105,589	0.09	0	1
Amount	105,589	7,727	61	1,000,000
Maturity	105,589	27.77	1	240
Annuity loan	105,589	0.74	0	1
Interest rate	105,589	14.66	5.75	19.88
Macroeconomic conditions				
Interest differential	54	1.36	0.36	3.22
EU announcement	54	0.22	0	1
Inflation volatility	54	0.98	0.45	1.71
Spread differential	54	-0.36	-2.40	2.08
Aggregate FX loans	54	0.63	0.54	0.68
Bank funding				
EUR wholesale funding	54	0.26	0.12	0.35
EUR customer funding	54	0.13	0.04	0.24

Table 4. Univariate tests

This table reports univariate tests for our explanatory variables. Columns (1,2,4,5,7,8) report subsample means fore each variable. For all log-transformed variables the statistics are calculated by using the original values. Columns (3,6,9) report the results of two-sided T-tests. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10-level. See Table 1 for definitions and sources of all variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Requested currency	BGN	EUR			BGN			EUR	
Granted currency				BGN	EUR		BGN	EUR	
Observations	101,350	4,239		99,480	1,870		296	3,943	
Firm characteristics									
EUR account	0.01	0.02	***	0.01	0.02	***	0.02	0.02	
Disposable income	688	4,720	***	647	2,854	***	2,284	4,903	*
Leverage	0.15	0.22	***	0.14	0.22	***	0.19	0.22	***
Sole proprietorship	0.91	0.46	***	0.92	0.54	***	0.65	0.44	***
Bank relationship	9.55	17.22	***	9.47	14.20	***	13.77	17.48	***
Assets	43,579	390,439	***	40,196	223,398	***	193,155	405,268	***
Age	8.41	9.19	***	8.40	8.97	***	8.80	9.21	
Loan application									
Requested amount	6,318	64,929	***	5,699	39,261	***	27,896	67,709	***
Requested maturity	31.08	50.94	***	30.64	54.40	***	39.96	51.76	***
Mortgage loan	0.07	0.68	***	0.06	0.54	***	0.27	0.71	***
Macroeconomic conditions									
Interest differential	1.25	1.28	***	1.25	1.25		1.17	1.29	***
EU announcement	0.31	0.26	***	0.31	0.59	***	0.31	0.26	*
Inflation volatility	0.93	0.94	**	0.93	0.90	***	0.93	0.94	
Spread differential	-0.24	-0.28	***	-0.24	0.04	***	-0.24	-0.28	
Aggregate FX loans	0.63	0.63	***	0.63	0.64	***	0.64	0.63	
Bank funding									
EUR wholesale funding	0.25	0.26	***	0.25	0.22	***	0.25	0.26	*
EUR customer funding	0.15	0.14	***	0.15	0.17	***	0.15	0.14	**

Table 5. Foreign currency loan demand

The dependent variable *EUR requested* equals one if the firm requested a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Columns (1) to (4) report marginal effects from logit estimations and columns (5) and (6) report OLS estimates. Standard errors are reported in brackets and account for clustering at the branch-industry level. ***, **, * denote significance at the 0.01, 0.05 and 0.10-level.

Coefficients	(1)	(2)	(3)	(4)	(5)	(6)
		All clients				Repeat clients
	Full sample	Medium loans	Amount > 5.000 EUR	Without mortgages	Including interaction terms with *Later loan*	
	Main effects	Main effects	Main effects	Main effects	Main effects	Interactions
EUR account	0.011***	0.041	0.052***	0.002	0.069***	-0.038*
	[0.004]	[0.100]	[0.016]	[0.002]	[0.020]	[0.020]
Disposable income	-0.001***	-0.082***	-0.006***	-0.000***	-0.004***	-0.000
	[0.000]	[0.013]	[0.001]	[0.000]	[0.001]	[0.001]
Leverage	-0.002***	-0.099	-0.008**	-0.002*	-0.000	-0.000
	[0.001]	[0.064]	[0.004]	[0.001]	[0.007]	[0.008]
Sole proprietorship	-0.002***	0.040	-0.012***	-0.002***	-0.100***	0.002
	[0.000]	[0.034]	[0.002]	[0.000]	[0.005]	[0.005]
Bank relationship	0.000***	0.002**	0.000***	0.000**	0.001**	-0.000
	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]
Assets	0.003***	0.075***	0.014***	0.002***	0.007***	0.007***
	[0.000]	[0.014]	[0.001]	[0.000]	[0.001]	[0.001]
Age	0.000	-0.063**	0.000	0.000		
	[0.000]	[0.031]	[0.001]	[0.000]		
Requested amount	0.006***	0.228***	0.030***	0.003***	0.029***	-0.003
	[0.000]	[0.024]	[0.001]	[0.000]	[0.002]	[0.002]
Requested maturity	0.003***	0.178***	0.016***	0.000	0.004	0.016***
	[0.000]	[0.018]	[0.002]	[0.000]	[0.002]	[0.003]
Mortgage loan	0.013***	0.130	0.056***		0.103***	0.093***
	[0.002]	[0.080]	[0.005]		[0.004]	[0.005]
Interest differential	0.001***	0.027	0.004**	0.000*	0.004*	-0.002
	[0.000]	[0.023]	[0.002]	[0.000]	[0.002]	[0.003]
EU announcement	-0.002***	-0.083***	-0.012***	-0.002***	0.001	-0.006
	[0.000]	[0.032]	[0.002]	[0.000]	[0.005]	[0.005]
Inflation volatility	-0.000	0.054	-0.002	-0.000	-0.008	-0.006
	[0.001]	[0.085]	[0.005]	[0.001]	[0.009]	[0.010]
Aggregate FX loans	-0.023***	0.219	-0.166***	-0.023***	-0.120*	-0.096
	[0.009]	[0.889]	[0.044]	[0.006]	[0.070]	[0.084]
Later loan					-0.043	
					[0.063]	
Observations	105,107	2,218	40,395	95,146		69,178
Method	Logit	Logit	Logit	Logit		OLS
R² (pseudo/overall)	0.446	0.187	0.383	0.320		0.273
Branch fixed effects	yes	yes	yes	yes		yes
Industry fixed effects	yes	yes	yes	yes		yes
Firm random effects	no	no	no	no		yes

Table 6. Foreign currency loan supply: Loans requested in BGN

Panel A. Logit regressions

This table reports marginal effects from logit estimations for the sample of loans requested in BGN only. The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. ***, **, * denote significance at the 0.01, 0.05 and 0.10-level.

	(1)	(2)	(3)	(4)	(5)
			Amount > 5.000	Without	
	Full sample	Medium loans	EUR	mortgages	Repeat clients
EUR account	0.004***	0.028	0.018**	0.001*	0.006
	[0.001]	[0.121]	[0.009]	[0.001]	[0.004]
Disposable income	0.000	0.008	0.000	0.000	0.000
	[0.000]	[0.018]	[0.000]	[0.000]	[0.000]
Leverage	-0.000	-0.056	-0.002	-0.000*	0.002
	[0.000]	[0.073]	[0.003]	[0.000]	[0.002]
Sole proprietorship	-0.001**	-0.005	-0.004***	-0.001***	-0.003***
	[0.000]	[0.033]	[0.002]	[0.000]	[0.001]
Bank relationship	-0.000	0.001	-0.000	-0.000	-0.000
	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]
Assets	0.001***	0.010	0.004***	0.000***	0.004***
	[0.000]	[0.019]	[0.001]	[0.000]	[0.000]
Age	-0.000	-0.034	-0.000	0.000	
	[0.000]	[0.035]	[0.001]	[0.000]	
Requested amount	0.002***	0.033	0.013***	0.001***	0.007***
	[0.000]	[0.028]	[0.001]	[0.000]	[0.001]
Requested maturity	0.002***	0.247***	0.013***	0.001***	0.009***
	[0.000]	[0.021]	[0.001]	[0.000]	[0.001]
Mortgage loan	0.006***	0.116***	0.034***		0.015***
	[0.001]	[0.030]	[0.004]		[0.002]
Spread differential	-0.000	-0.012	-0.000	0.000	-0.000
	[0.000]	[0.016]	[0.000]	[0.000]	[0.000]
EU announcement	0.003***	0.111	0.017***	0.001***	0.008***
	[0.001]	[0.088]	[0.003]	[0.000]	[0.002]
Inflation volatility	-0.002***	0.072	-0.013***	-0.001***	-0.005**
	[0.000]	[0.114]	[0.004]	[0.000]	[0.002]
Aggregate FX loans	-0.040***	-1.119	-0.286***	-0.020***	-0.150***
	[0.006]	[1.092]	[0.037]	[0.003]	[0.025]
EUR wholesale funding	0.003*	0.761**	0.023*	0.000	0.013
	[0.002]	[0.305]	[0.014]	[0.002]	[0.008]
EUR customer funding	0.019***	0.622	0.136***	0.006**	0.088***
	[0.004]	[0.879]	[0.028]	[0.003]	[0.019]
Observations	101,049	1,017	36,505	93,981	66,003
Method	Logit	Logit	Logit	Logit	Logit
R² (pseudo)	0.418	0.221	0.323	0.368	
Wald Chi²-statistic for model goodness-of-fit					1,133.55***
Branch fixed effects	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes
Firm random effects	no	no	no	no	yes

Panel B. Loans requested in BGN - instrumental variable approach

This table reports marginal effects from IV probit estimations in columns (1) to (4) and OLS estimates in column (5) for the sample of loans requested in BGN only. The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise. We instrument the variable EUR wholesale funding with the spread between Bulgarian and German sovereign debt in EUR obtained on a monthly basis for our whole observation period from Bloomberg. All explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. ***, **, * denote significance at the 0.01, 0.05 and 0.10-level. Athrho is the estimate of the inverse hyperbolic tangent of ρ, the correlation among the errors in the first and second-stage regression equations. The table also provides Wald Chi² statistics for the independence of the two equations and the model goodness-of-fit.

	(1)	(2)	(3)	(4)	(5)
		Medium	Amount >	Without	
	Full sample	loans	5.000 EUR	mortgages	Repeat clients
EUR wholesale funding	0.026*	0.386	0.140**	0.008	0.100
	[0.015]	[2.551]	[0.055]	[0.008]	[0.118]
EUR customer funding	0.034***	0.323	0.276***	0.011	0.216***
	[0.013]	[2.644]	[0.060]	[0.007]	[0.071]
athrho	-0.208**	0.049	-0.114**	-0.162	
	[0.105]	[0.298]	[0.046]	[0.146]	
Observations	101,049	1,017	36,505	93,981	66,003
Method	IV probit	IV probit	IV probit	IV probit	IV OLS
Wald Chi²-test of exogeneity	3.91**	0.03	6.17**	1.23	
Wald Chi²-statistic for model goodness-of-fit	3,935.96***	327.39***	3,443.31***	3,046.96***	
R² (overall)					0.117
Firm characteristics, Loan application,					
Macroeconomic conditions	yes	yes	yes	yes	yes
Branch fixed effects	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes
Firm random effects	no	no	no	no	no

Table 7. Foreign currency loan supply - Loans requested in EUR

This table reports marginal effects from logit estimations for the subsample of loans requested in EUR only. The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. ***, **, * denote significance at the 0.01, 0.05 and 0.10-level.

	(1)	(2)	(3)	(4)	(5)
			Amount > 5.000	Without	
	Full sample	Medium loans	EUR	mortgages	Repeat clients
EUR account	0.007		-0.002	-0.052	0.016
	[0.012]		[0.013]	[0.082]	[0.019]
Disposable income	-0.002	-0.003	-0.003	0.003	-0.001
	[0.002]	[0.003]	[0.002]	[0.010]	[0.004]
Leverage	-0.005	-0.010	-0.011	-0.041	-0.015
	[0.012]	[0.011]	[0.009]	[0.039]	[0.019]
Sole proprietorship	-0.010*	0.005	-0.009*	-0.062***	-0.011
	[0.005]	[0.007]	[0.005]	[0.017]	[0.009]
Bank relationship	0.000	0.000	0.000	-0.000	-0.000
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
Assets	0.017***	0.002	0.014***	0.061***	0.023***
	[0.002]	[0.004]	[0.003]	[0.010]	[0.005]
Age	-0.004	-0.003	-0.002	-0.009	
	[0.004]	[0.004]	[0.004]	[0.016]	
Requested amount	0.000	0.006	0.000	-0.022	-0.003
	[0.003]	[0.004]	[0.003]	[0.015]	[0.005]
Requested maturity	0.005	0.010***	0.008**	-0.018	0.019***
	[0.004]	[0.003]	[0.003]	[0.013]	[0.006]
Mortgage loan	0.085***	0.027*	0.071***		0.064***
	[0.013]	[0.016]	[0.014]		[0.012]
Spread differential	0.002	0.002	0.003	0.000	0.004
	[0.003]	[0.003]	[0.003]	[0.012]	[0.004]
EU announcement	0.010	-0.008	0.012	-0.034	0.004
	[0.011]	[0.017]	[0.011]	[0.047]	[0.018]
Inflation volatility	-0.016	-0.024	-0.018	-0.085	-0.027
	[0.014]	[0.017]	[0.013]	[0.053]	[0.026]
Aggregate FX loans	-0.161	-0.073	-0.193	-1.237**	-0.442
	[0.129]	[0.199]	[0.133]	[0.534]	[0.283]
EUR wholesale funding	0.038	0.053	0.033	-0.101	0.204**
	[0.051]	[0.062]	[0.059]	[0.181]	[0.092]
EUR customer funding	-0.092	-0.032	-0.127	0.393	0.226
	[0.127]	[0.145]	[0.131]	[0.380]	[0.215]
Observations	4,222	935	3,932	1,323	3,175
Method	Logit	Logit	Logit	Logit	Logit
R² (pseudo)	0.211	0.162	0.159	0.192	
Wald Chi²-statistic for model goodness-of-fit					104.08***
Branch fixed effects	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes
Firm random effects	no	no	no	no	yes

Table 8. Interest rate on medium loans in EUR

This table reports estimations for the sample of medium loans in EUR only. The dependent variable *Interest rate* is the nominal interest rate charged on the loan at disbursement, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the branch-industry level. ***, **, * denote significance at the 0.01, 0.05 and 0.10-level.

	(1) Full sample	(2) Repeat clients	(3) Full sample
EUR account	-0.512**	-0.287	-0.509**
	[0.201]	[0.228]	[0.197]
Disposable income	-0.091***	-0.068*	-0.091***
	[0.031]	[0.035]	[0.031]
Leverage	-0.625***	-0.657***	-0.626***
	[0.164]	[0.171]	[0.164]
Sole proprietorship	0.266***	0.271***	0.266***
	[0.054]	[0.084]	[0.054]
Bank relationship	-0.004*	-0.005**	-0.004*
	[0.002]	[0.002]	[0.002]
Assets	-0.104*	-0.133***	-0.104*
	[0.053]	[0.040]	[0.053]
Age	0.063		0.063
	[0.056]		[0.055]
Amount	-0.339***	-0.278***	-0.340***
	[0.064]	[0.057]	[0.064]
Maturity	0.180***	0.155***	0.180***
	[0.062]	[0.056]	[0.061]
Annuity loan	0.042	0.014	0.044
	[0.195]	[0.139]	[0.195]
Mortgage loan	0.455***	0.252**	0.455***
	[0.126]	[0.127]	[0.126]
BGN requested	0.181***	0.122*	0.318***
	[0.063]	[0.073]	[0.118]
BGN requested Interest differential*			-0.112
			[0.091]
Constant	17.203***	16.870***	17.242***
	[0.553]	[0.702]	[0.553]
Observations	1,473	1,168	1,473
Method	OLS	OLS	OLS
R² (adjusted / overall)	0.450	0.463	0.450
Branch fixed effects	yes	yes	yes
Industry fixed effects	yes	yes	yes
Quarter fixed effects	yes	yes	yes
Firm random effects	no	yes	no

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